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ABSTRACT

A study was designed to (1) develop a research design capable of analyzing a large quantity of data relating to teacher movement; (2) assess the implications of selected personal, economic, demographic; and educational school district characteristics for the decision-making behavior of migratory teachers; and (3) determine the influence of similar school system characteristics on attrition from the teaching profession. Three indices were developed for analyzing teacher migration and attrition (dependent variables) at the statewide level and in the Detroit metropolitan region. Most of the 14 independent variables were characteristics of local school districts. A variety of multivariate techniques were employed in analyzing data. Predictors found to be of explanatory and predictive importance were used as the basis for aggregating transition matrices showing actual migration and attrition flows. Results showed extensive turnover losses attributable to migration and attrition. Teacher movement was heaviest within rather than between the metropolitan and state cells. Economic correlates assume an important role in supply with demographic factors of limited value. Various important patterns of turnover were determined at both state and metropolitan levels utilizing educational and professional background predictors as bases for aggregation. (Included is discussion of findings related to 16 specific hypotheses and implications for policy and practice and for research and theory.) (JS)

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ECONOMIC AND SOCIOLOGICAL CORRELATES OF TEACHER TURNOVER[1]

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This study was designed to investigate the effects of selected sociological and economic variables on the migration and attrition behavior of the public classroom teachers in a single state.[2] Historically, the United States has demonstrated a deep and abiding faith in public education and much of this commitment has been manifested in a tradition of decentralized decision making in which each community has assumed a major role in determining the quantity and quality of schooling to be provided to its children. Usually associated with autonomy at the individual school district level has been the necessity to provide a sizeable portion of the resources needed to purchase the necessary educational goods and services. It is generally agreed that the most important of these latter inputs involves the services of competent professional personnel and it is to one dimension of this problem that this research is devoted.

Strategies for the attraction and retention of able teachers are important policy matters worthy of consideration at all levels of educational government. For the present at least, the possibilities of improving the quality of education are strongly influenced by the competence of the human services which local school systems can employ. Factors which influence where teachers seek, accept, and remain in employment are

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[1]Paper presented to the American Educational Research Association, Minneapolis, March, 1970.

[2]Material reported here is drawn primarily from K. George Pedersen, "Selected Correlates of Teacher Migration and Attrition" (unpublished Ph.D. dissertation, University of Chicago, 1969).

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of particular concern to policy-making groups such as local and state boards of education and their associated administrative personnel. As an example of the importance of this problem, educational administrators frequently cite as evidence of their concern that high rates of teacher turnover are detrimental to continuity in curriculum planning and implementation, disruptive to the learning experiences of students, cause disproportionate time demands for recruiting, and create increased strains on school system budgets.

The Problem

The phenomenon of human migration can be viewed from a number of perspectives but for the purpose of this study it was considered primarily as a direct form of investment in human beings. It has been demonstrated that expenditures on information, health services, education, on-the-job training, and human migration are all capable of increasing the productive capacity of the individual.[1] This study treats migration as an investment which increases the productivity of human resources, and for which there are costs and associated returns. Migration is considered an operational response of people to the basic economic concept of supply and demand in the market place. In this sense, it is believed that regions and localities differ along a number of important dimensions, both economic and sociological, and that people migrate to alleviate a portion of these disparities.

Factors related to an adequate supply of teachers are important practical concerns of this research, since the migration of teachers is the means by which the services of professional educators are allocated throughout the public educational system. Economists have often pointed out that the

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[1]For an excellent review of recent research on this topic, see Mary Jean Bowman, "The Human Investment Revolution in Economic Thought," Sociology of Education, XXXIX, No. 2 (Spring, 1966), 111-137.

general problem of teacher shortages could be overcome by increasing substantially the salaries of all teachers.[1] It is argued that salaries constitute an important determinant in motivating people to enter various occupational strata and that any political entity, through its system of compensation, can achieve what it considers an appropriate allocation of its manpower. Obviously school systems vary in their ability to provide economic benefits, and therefore it is important to understand the effects which fiscal factors have on the supply of teachers.

Not only do school systems differ in terms of their economic ability to support education, but they exhibit a comparable range of differences along the sociological dimension as well. Presumably the latter also have important implications for the availability of teacher resources. Consequently this research constituted an attempt to understand the effects of selected economic and sociological correlates on the migration and attrition behavior of public school classroom teachers within a single northern industrialized state.

Design and Methodology

Many of the earlier studies of migration have demonstrated that a simple accounting approach is extremely limited in value, primarily because of their failure to consider resources embodied in the migrant. This study focuses on the theory of human capital, accepting the conception that migration and educational preparation are investments in the human agent. Although this conceptualization of human capital and its relevance to human relocation is not of recent derivation, the current revival of interest in

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[1]See, for example, the arguments of J. Kershaw and R. McKean, Teacher Shortages and Salary Schedules (New York: McGraw-Hill, 1962).

the allocation of valued human resources has resulted in the consideration of new approaches to the study of human movement.[1]

As employed in this study, migration is conceived to be an investment which increases the productivity of resources and it is argued that individuals rely heavily on anticipated future earnings to determine the rationality of decisions related to moving. Theoretically at least, migration flows will increase if the total monetary and psychic returns to migration exceed the costs of relocation.

Using the conceptual underpinnings of the human capital approach to human relocation, this research was motivated by three major purposes: (1) to develop a research design capable of analyzing a large quantity of data relating to teacher movement; (2) to assess the implications of selected personal, economic, demographic, and educational school district characteristics for the decision-making behavior of migratory teachers; and (3) to determine the influence of similar school system characteristics on attrition from the teaching profession. In response to these three purposes, analytical indices capable of providing insights into the variants of teacher migration and attrition behavior were developed. These measures were then employed to test an extensive quantity of data in order to evaluate the effect of selected correlates on teacher turnover.

Data were gathered from a variety of sources including the Michigan School Finance Study [2] and local school districts. The methodology employed

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[1]The major credit for the present "renaissance" of the human capital concept must be accorded Theodore W. Schultz. See for example Theodore W. Schultz, The Economic Value of Education (New York: Columbia University Press, 1963); and "Human Capital Formation by Education," The Journal of Political Economy, XLVIII (December, 1960), 571-583.

[2]J. Alan Thomas, School Finance and Educational Opportunity in Michigan (Lansing, Michigan: Michigan Department of Education, 1968).

in this study was heavily dependent upon the services of the electronic computer. For example, among the data available was extensive information on the nearly 76,000 classroom teachers employed in the local school systems providing K-12 programs during the 1965-66 school year. Table 1 provides a statewide breakdown of teachers by age-sex categories, using the age groupings employed throughout the study.

TABLE 1

STATEWIDE TOTALS OF CLASSROOM TEACHERS: 1965-66

Age Category	Males		Females		Total	
	N	%	N	%	N	%
Less than 30	9,206	12.1	16,804	22.1	26,010	34.2
30-45	11,974	15.8	12,370	16.3	24,344	32.1
Over 45	4,774	6.3	20,849	27.4	25,623	33.7
Total	25,954	34.2	50,023	65.8	75,977	100.0

Data descriptive of the 533 school systems were included as well and analyzed on computer facilities at Michigan State University and the University of Chicago. In addition to considering the migration and attrition behavior of classroom teachers at the statewide level, a more detailed investigation was conducted using data for the three counties which comprise the Detroit Standard Metropolitan Statistical Area (SMSA).[1] Approximately one-half of all Michigan professional educators and public school students were located within the boundaries of this metropolitan region.

Thus this study dealt with two distinct, yet related, dimensions of the supply of human educational resources. Each of these two aspects,

[1]Defined by the U.S. Department of the Census to include Macomb, Oakland, and Wayne Counties, a tri-county region which includes eighty-two local K-12 school units.

inter-district movement and attrition, was considered at both the state and metropolitan level, thus resulting in a four-pronged analysis of teacher turnover. In order to satisfy this analytical focus, it became necessary to generate three indices.

Migration and attrition indices

A total of three indices were used in the analysis of teacher migration and attrition. The first of these, the "Velocity Index of Migration Stream," is a modification of previous work suggested by Bogue et al.[1] As employed in this research, the formulation is:

$$(1) \quad VI_{ij} = \frac{M_i}{P_i} \cdot \frac{M_{i \to j}}{M_i} + \frac{P_j}{P_t} = \frac{M_{i \to j}}{P_i \cdot P_j} P_t$$

where,

VI_{ij} = the rate of flow (velocity) of the migration stream from district i to district j

M_i = the number of migrants in the stream from district i to all districts

$M_{i \to j}$ = the number of migrants in the stream from district i to district j

P_i = the total teaching population in the sending district i

P_j = the total teaching population in the receiving district j

P_t = the total teaching population of all potential areas of destination, including the area of origin.

This measure is an abstraction which expresses the relative degree of intensity of the migration stream as a rate by eliminating the effect of the population size of both the sending and receiving districts. Bogue and his associates argued persuasively that the use of such a normative measure of relative stream velocity, rather than in-, out-, or net-migration rates, constitutes a marked

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[1] D.J. Bogue, H.S. Shryock, Jr., and S.A. Hoermann, Subregional Migration in the United States: Streams of Migration, Scripps Foundation Studies in Population Distribution, I, No. 5 (Oxford, Ohio: Scripps Foundation, Miami University, 1957).

improvement in the study of migration streams. The elements of the above formulation can be considered separately as:

(a) Total supply factor = $\frac{M_i}{P_i}$, which is the proportion of initial district i teachers who actually move from district i to all other districts. This could also be considered a "push" factor

(b) Unadjusted selectivity of destination factor = $\frac{M_{i \to j}}{M_i}$, which is the proportion of initial district i teachers who actually move from district i to district j

(c) Demand adjustment factor = $\frac{P_j}{P_t}$, which is the proportion of total teaching positions available in district j.

Thus, the Velocity Index is the function of a total mobility factor (the supply factor multiplied by the selectivity factor) divided by its related demand adjustment factor. The value in this expression lies in the control of the common elements of the formulation, thus allowing it to be used as a dependent variable which can be subjected appropriately to multivariate analysis.

The second index developed to assist in the migration analysis relates to the selectivity of migrants as they relocate in search of new benefits. This attempts to answer the question, "When migrants only are considered, is there a pattern of selective mobility which can be discerned?" This formulation, called the "Selectivity of Migration Index"[1] can be expressed mathematically as:

$$(2) \qquad S_{ij} = \frac{M_{i \to j}}{M_i . M_j} \quad \text{or, alternatively as} \quad S_{ij} = \frac{M_{i \to j}}{M_i . M_j} M_t$$

The assistance of Professor Mary Jean Bowman, Professor of Economics and Education, University of Chicago, in developing this formulation is gratefully acknowledged.

where,

S_{ij} = the selectivity rate of the migration stream from district i to district j

$M_{i\rightarrow j}$ = the number of migrants in the stream from district i to district j

M_i = the total number of migrants from district i to all receiving districts

M_j = the total number of teaching positions available in district j as a result of out-migration

M_t = the total out-migrants from all districts.

The first of these was the one used, but relationships would of course be essentially unaffected by substitution of the second formulation, since within this study M_t is a constant. While much of the rationale for the Velocity Index is equally appropriate in considering this selectivity formulation, important differences do exist and it may be of interest to consider them.

If the demand for migrants in district j is expressed as:

$$D_j = \Delta P_j + A_j - E_j + M_{j\rightarrow} + \Delta V_j$$

where,

ΔP_j = the change (growth) in the teacher population in district j

A_j = the teacher attrition through retirement or withdrawal from teaching

E_j = the number of new teachers employed in district j

$M_{j\rightarrow}$ = the number of out-migrants from district j

ΔV_j = any additional vacancies created in district j

It may be noted that, tautologically, the number of migrants into district j may now be described by the equation

$$M_{\rightarrow j} = D_j - \Delta V_j$$

and if it is assumed that $V_j = 0$, then

$$M \rightarrow j = D_j$$

If, and only if, in addition

$$\Delta P_j + A_j = E_j \text{ , then}$$

$$M \rightarrow j = M_j \rightarrow$$

which is an assumption in the formulation of the Selectivity of Migration Index employed. Assuming $M \rightarrow j = M_j \rightarrow$ and designating this simply as M_j, the following abstractions of S_{ij} may be written:

$$(2.1) \quad S'_{ij} = \frac{M_{i \rightarrow j}}{M_i} \div \frac{M_j}{M_t}$$

or

$$(2.2) \quad S'_{ij} = \frac{M_{i \rightarrow j}}{M_j} \div \frac{M_i}{M_t}$$

or

$$(2.3) \quad S'_{ij} = M_t \frac{M_{i \rightarrow j}}{M_i . M_j} = M_t S_{ij}$$

Thus, in (2.1),

$\frac{M_{i \rightarrow j}}{M_i}$ is the unadjusted selectivity of destination factor of district i out-migrants and $\frac{M_j}{M_t}$ is the adjustment factor for net available openings, and

in (2.2),

$\frac{M_{i \rightarrow j}}{M_j}$ is the unadjusted selectivity of origin factor of district j in-migrants and $\frac{M_i}{M_t}$ is the adjustment factor for potential supplies (mobile persons of district i), and

in (2.3),

$M_{i \rightarrow j}$ is adjusted simultaneously for both origin and destination constraints.

In terms of further comparisons between the Velocity Index and the Selectivity of Migration Index, it may be noted that the mobility rate component $\frac{M_i}{P_i}$ is eliminated in the latter, thus removing the independent "push" factor from consideration. Furthermore, the Selectivity of Migration Index specifies the demand component in terms of openings for migrants.

From the foregoing, it may be evident that certain economic and sociological terms are employed interchangeably throughout this study. Specifically, the familiar "supply" and "demand" components from economics have been equated with the "push" and "pull" factors favored by sociologists and demographers. While such equation may elicit limited enthusiasm from neither of the disciplines its usage appears justified in view of the nature of this study.

A third index was developed in order to analyze selected correlates of attrition from teaching positions in the state. In mathematical notation, this conception, entitled the "Attrition Index," takes the form:

$$(3) \qquad AT_i = \frac{D_i}{P_i} k$$

where,

AT_i = the rate of classroom attrition in school district i

D_i = the total number of 1965-66 district i teachers who failed to return to a public school teaching position in Michigan for the 1966-67 school term

P_i = the total number of classroom teachers employed in district i during the 1965-66 school year

k = a constant equal to 100

The Velocity Index, along with associated transformations, and the Selectivity Index, were utilized as dependent variables in the analysis of teacher migration. These migration indices were computed for randomly selected pairs of school systems for which total information was available. For the attrition phase of the study, an Attrition Index was computed for each defined category of teacher in the large district samples used.

The independent variables

The predictor variables utilized in this study were primarily selected characteristics of local school districts and in the majority of cases were expressed in ratio form. In all phases of the migratory analysis, characteristics of both sending and receiving school system units were employed. Predictors used were considered within the framework of four broad domains and included the following:

(a) Personal domain: the age, sex, and marital status composition of teachers employed in local systems

(b) Economic domain: state equalized valuation, expenditures per pupil, average teachers' salary, present value of lifetime earnings stream, steepness of salary schedule, and the ratio of maximum to minimum salary

(c) Demographic domain: school system size, school district growth, and distance

(d) Professional/educational domain: certification, degree preparation, and type of training institution attended.

Sampling was required at two stages during the study. First, because no reliable data were available concerning the marital status of teachers, a stratified random sample of teachers was necessitated; and second, samples of randomly matched pairs of school systems were employed in order to generate the migration and attrition indices. A variety of multivariate techniques were employed in analyzing the data, including canonical correlation, factor, and

multiple regression analyses.

The empirical portion of the research focused on an analysis of the relationship between teacher movement, both internal and external, and the economic and sociological correlates selected. Having identified the independent variables of explanatory and predictive importance to teacher turnover, these predictors were then used as the basis for aggregating transition matrices showing the actual migration and attrition flows for the total classroom teacher population in the two political regions studied. At the metropolitan level of analysis, particular emphasis was placed on the importance of economic benefit differentials.

Summary of Findings

Results show that the turnover losses attributable to teacher migration and attrition are extensive. During the single transition period considered, only four-fifths of Michigan's teachers were retained. As shown in Table 2, slightly more than 4 per cent of the teaching population migrated to other public school districts in the state, but an additional 16 per cent dropped out of the profession during this transition period. Evidence presented also identifies the high non-retention risk incurred when employing young professionals, particularly females. Similar results were determined in the analysis of teacher turnover in the metropolitan region, with non-retention inversely correlated with age and undergraduate degree preparation, females again holding a definite edge in relative losses. An added finding of interest is that with limited exceptions, the acquisition of a graduate degree signifies a greater commitment to the teaching profession.

TABLE 2

TOTAL STATEWIDE TURNOVER FLOWS OF MICHIGAN CLASSROOM TEACHERS FROM JUNE TO SEPTEMBER, 1966

Age and Sex Category	Total Non-Movers		Total Migrants		Total Dropouts	
	N	%	N	%	N	%
Males <30	7,196	78.2	474	5.1	1,536	16.7
Males 30-45	10,003	83.5	524	4.4	1,447	12.1
Males >45	4,101	85.9	114	2.4	559	11.7
Females <30	10,739	63.9	1,217	7.2	4,848	28.9
Females 30-45	10,344	83.6	458	3.7	1,568	12.7
Females >45	18,278	87.7	353	1.7	2,218	10.6
Total	60,661	79.9	3,140	4.1	12,176	16.0

A second generalization of interest determined through the use of transition matrices is that teacher movement was heaviest within, rather than between cells. This suggests that teachers prefer to relocate in school systems with characteristics similar to those evidenced by their district of origin. Where deviations were evidenced, the dominant movement was to school districts characterized by a higher level of benefits, a pattern which was particularly pronounced when economic correlates were employed as the basis for aggregation.

Comparisons between metropolitan and state levels showed that the urban region attracts considerably greater numbers of younger and middle-aged females, at the expense of the older female cohort which dominates the less urbanized parts of Michigan. Relatively fewer young male teachers were employed in the SMSA, indicating a preference on the part of this group of educators to be employed in other regions of the state or an inability of the teaching profession to compete for such personnel in the urban setting. A second general difference determined was a higher overall rate of retention

in the metropolitan region, reflecting both lower migration rates and relatively fewer dropouts from the profession.

Considerable evidence was found to support the contention that economic correlates assume an important role in the supply of professional educators. The wealth of a school system, defined in terms of equalized valuation, expenditures per pupil, and average teacher remuneration (see Table 3), have important implications for the attraction and retention of teachers, particularly younger members of the profession. Of particular importance in this study was the effect of considering discounted lifetime earnings streams on teacher retention, and particularly so in relation to male educators. The turnover patterns revealed in the various matrices illustrates clearly a strong relationship which exists between teacher retention and the economic returns incorporated in salary data and related fiscal fringe benefits. Again greater evidence was provided in support of this generalization as it relates to younger members of the profession, and particularly to young male teachers. Data relating to this latter group are provided in Table 4.

Throughout all phases of the study, the demographic predictors selected for inclusion were of limited value. Certain trends were evident, however. Information provided concerning the size of the public school system indicated that larger school districts are better able to maintain continuity of teacher services than are smaller ones. In addition, systems evidencing high growth rates have lower rates of out-migration and attrition; similarly such expanding units have appeal for those teachers seeking to relocate.

Various important patterns of teacher turnover were determined at both the state and metropolitan levels, utilizing predictors descriptive of the educational and professional backgrounds of teachers as a basis for aggregation. For example, at the statewide level of analysis, provisional

TABLE 3

TRANSITION MATRIX OF TOTAL STATEWIDE TEACHER MIGRATION AND ATTRITION BETWEEN AND WITHIN CATEGORIES, ACCORDING TO AVERAGE TEACHERS' SALARIES (AVSAL)

From \ To	Items	Lower Quartile ($4507 to $5896)	Low Mid Quartile ($5897 to $6450)	High Mid Quartile ($6451 to $7241)	Upper Quartile ($7242 to $9892)	Migrant Totals and %'s	Dropout Totals and %'s	Non-Mover Totals and %'s
Lower Quartile (N=10,070)	No. of Mig.	303	247	170	85	805	1,800	7,465
	% of Mig.	37.6%	30.7%	21.1%	10.6%			
	% of Pop.	3.0%	2.5%	1.7%	0.8%	8.0%	17.9%	74.1%
	Vel. Index	.2270	.1251	.0670	.0201			
	Selmig	.0005	.0004	.0003	.0001			
Low Mid Quartile (N=14,899)	No. of Mig.	177	232	224	152	785	2,542	11,572
	% of Mig.	22.6%	29.6%	28.5%	19.4%			
	% of Pop.	1.2%	1.6%	1.5%	1.0%	5.3%	17.0%	77.7%
	Vel. Index	.0896	.0794	.0597	.0243			
	Selmig	.0003	.0004	.0004	.0003			
High Mid Quartile (N=19,143)	No. of Mig.	114	154	241	273	782	3,120	15,241
	% of Mig.	14.6%	19.7%	30.8%	34.9%			
	% of Pop.	0.6%	0.8%	1.3%	1.4%	4.1%	16.3%	79.6%
	Vel. Index	.0449	.0410	.0500	.0340			
	Selmig	.0002	.0003	.0004	.0005			
Upper Quartile (N=31,865)	No. of Mig.	67	109	254	338	768	4,714	26,383
	% of Mig.	8.7%	14.2%	33.1%	44.0%			
	% of Pop.	0.2%	0.3%	0.8%	1.1%	2.4%	14.8%	82.8%
	Vel. Index	.0159	.0174	.0316	.0253			
	Selmig	.0001	.0002	.0004	.0006			
Column Totals (N=75,977)	No. of Mig.	661	742	889	848	3,140	12,176	60,661
	% of Pop.	0.9%	1.0%	1.2%	1.1%	4.1%	16.0%	79.9%

TABLE 4

TRANSITION MATRIX OF YOUNG MALE (<30, BACHELOR'S DEGREE) METROPOLITAN MIGRATION AND ATTRITION BETWEEN AND WITHIN CATEGORIES, ACCORDING TO LIFETIME EARNINGS STREAMS (B26 0)

From \ To	Items	Lower Quartile ($341,417 $398,273)	Low Mid Quartile ($398,274 $412,325)	High Mid Quartile ($412,326 $417,945)	Upper Quartile ($417,946 $449,508)	Migrated to Other Michigan Systems	Migrant Totals and Z's	Dropout Totals and Z's	Non-Mover Totals and Z's
Lower Quartile (N=650)	No. of Mig.	6	9	2	11	18	46	113	491
	Z of Mig.	13.0Z	19.6Z	4.4Z	23.9Z	39.1Z			
	Z of Pop.	0.9Z	1.4Z	0.3Z	1.7Z	2.8Z	7.1Z	17.4Z	75.5Z
	Vel. Index	.0456	.0590	.0088	.0797				
	Selmig	.0028	.0054	.0008	.0082				
Low Mid Quartile (N=753)	No. of Mig.	3	8	4	10	11	36	106	611
	Z of Mig.	8.3Z	22.2Z	11.1Z	27.8Z	30.6Z			
	Z of Pop.	0.4Z	1.1Z	0.5Z	1.3Z	1.5Z	4.8Z	14.1Z	81.1Z
	Vel. Index	.0197	.0453	.0151	.0625				
	Selmig	.0018	.0062	.0021	.0096				
High Mid Quartile (N=1,126)	No. of Mig.	8	12	10	13	10	53	153	920
	Z of Mig.	15.1Z	22.6Z	18.9Z	24.5Z	18.9Z			
	Z of Pop.	0.7Z	1.1Z	0.9Z	1.2Z	0.9Z	4.7Z	13.6Z	81.7Z
	Vel. Index	.0351	.0454	.0253	.0544				
	Selmig	.0033	.0063	.0036	.0085				
Upper Quartile (N=682)	No. of Mig.	5	3	1	15	5	29	81	572
	Z of Mig.	17.2Z	10.3Z	3.5Z	51.7Z	17.2Z			
	Z of Pop.	0.7Z	0.4Z	0.2Z	2.2Z	0.7Z	4.2Z	11.9Z	83.9Z
	Vel. Index	.0362	.0188	.0042	.1036				
	Selmig	.0037	.0029	.0007	.0178				
Column Totals (N=3,211)	No. of Mig.	22	32	17	49	44	164	453	2,594
	Z of Pop.	0.7Z	1.0Z	0.5Z	1.5Z	1.4Z	5.1Z	14.1Z	80.8Z

certification and teacher training received at out-of-state training institutions were important in predicting the annual teacher supply (see Table 5). For metropolitan teachers, interim teaching credentials were again important; in addition, greater proportions of teachers with degree preparation at the bachelor's level were associated with higher rates of turnover. Also of interest in the SMSA was evidence showing that the employment of teachers trained in higher status Michigan institutions ensures greater stability in the local teaching force.

The above generalizations reflect primarily the evidence of total teacher movement obtained through the use of variously aggregated transition matrices. However, based on a conceptualization in which teachers were believed to relocate in response to regional disparities, sixteen specific hypotheses relating to characteristic differences in school systems were generated to guide the empirical portion of this study. A description of their particular relevance follows.

Specific Findings and Interpretations

The particular postulates and a brief statement concerning their appropriateness as a result of the empirical findings are summarized below, presented according to the domains employed in the study.

Personal domain

Based upon previous research findings which had suggested age, sex, and marital status to be important correlates of human movement, four hypotheses were considered within the rubric of this domain. Included were:

> Hypothesis 1: The higher the ratio of young teachers (less than thirty years of age) to the total teaching force in district j, the higher the teacher migration rate from school district j.

TABLE 5

TRANSITION MATRIX OF TOTAL STATEWIDE TEACHER MIGRATION AND ATTRITION BETWEEN AND WITHIN CATEGORIES, ACCORDING TO OUT-OF-STATE TRAINING (OUTST)

From \ To	Items	Lower Quartile (.0000 to .1434)	Low Mid Quartile (.1435 to .1888)	High Mid Quartile (.1889 to .2796)	Upper Quartile (.2797 to .7097)	Migrant Totals and %'s	Dropout Totals and %'s	Non-Mover Totals and %'s
Lower Quartile (N=26,480)	No. of Mig. % of Mig. % of Pop. Vel. Index Selmig	244 31.1% 0.9% .0264 .0004	233 29.7% 0.9% .0334 .0004	175 22.3% 0.7% .0331 .0003	132 16.8% 0.5% .0265 .0002	784 3.0%	3,786 14.3%	21,910 82.7%
Low Mid Quartile (N=19,995)	No. of Mig. % of Mig. % of Pop. Vel. Index Selmig	172 22.1% 0.9% .0247 .0003	209 26.8% 1.1% .0397 .0003	205 26.3% 1.0% .0513 .0003	194 24.9% 1.0% .0515 .0003	780 3.9%	3,235 16.2%	15,980 79.9%
High Mid Quartile (N=15,189)	No. of Mig. % of Mig. % of Pop. Vel. Index Selmig	161 21.0% 1.1% .0304 .0003	227 29.6% 1.5% .0568 .0004	203 25.5% 1.3% .0669 .0003	176 23.0% 1.2% .0615 .0003	767 5.1%	2,527 16.6%	11,895 78.3%
Upper Quartile (N=14,313)	No. of Mig. % of Mig. % of Pop. Vel. Index Selmig	129 16.0% 0.9% .0259 .0002	238 29.4% 1.7% .0632 .0004	193 23.9% 1.4% .0674 .0003	249 30.5% 1.7% .0923 .0004	809 5.6%	2,628 18.4%	10,876 76.0%
Column Totals (N=14,313)	No. of Mig. % of Pop.	706 0.9%	907 1.2%	776 1.0%	751 1.0%	3,140 4.1%	12,176 16.0%	60,661 79.9%

Results determined through this research provide overwhelming evidence that the age composition of the faculty of a school system has important implications for teacher turnover resulting from inter-district movement. This hypothesis is accepted.

> Hypothesis 2: The higher the ratio of single teachers to the total teaching force in district j, the higher the teacher migration rate from school district j.

In general, this postulate was rejected at both the state and metropolitan levels. Only for a single criterion was support found, thus indicating that this predictor is of limited value in predicting teacher migration.

> Hypothesis 3: The higher the ratio of female teachers to the total teaching force in district j, the higher the teacher migration rate from school district j.

In terms of the total population of teachers, this hypothesis is rejected. However, a number of qualifications must be considered when specific age-sex and age-sex-degree categories of teacher are controlled. Of the ten possible comparisons, males exhibited higher rates of exodus in six cases. Specifically, this hypothesis is accepted for total younger females, younger and older females with undergraduate levels of training, and for younger females with graduate degree preparation.

> Hypothesis 4: The higher the ratio of young (less than thirty years of age) female teachers to the total teacher force in district j, the higher the professional attrition rate.

This hypothesis was totally supported, as evidenced by an annual attrition rate of 28.9 per cent for young females at the state level, and comparable SMSA rates of 25.9 and 26.3 per cent for young women with undergraduate and graduate degree level training respectively. These figures are approximately twice those of the next highest teacher category; attrition

figures of an awesome magnitude.

To summarize the results for this domain, it is clearly evident that the age and sex characteristics of the teaching population have important implications for teacher retention. Further support has been provided for the previously well-documented finding that, to use Charters' words:

> . . ., variations in turnover rate from school to school [and presumably from school system to school system] reflect in large measure the differential composition of the faculty --in terms of sex, age, and years of tenure already achieved.[1]

Economic domain

Attempts to determine the relevance of this domain for the migration and attrition behavior of classroom teachers provided the major thrust of this study. Migration was viewed primarily as a type of rational, individual decision-making, in which the migrant perceived district-to-district movement as an investment with associated benefits, the latter in the form of increased lifetime earnings and improved conditions of work. Costs, in terms of this research, were conceived primarily as employment alternatives, assuming that it is normally possible for teachers to seek and accept employment in districts which provide greater benefits than such personnel are currently receiving.

> Hypothesis 5: The higher the average salary in school district i as compared to school district j, the higher the teacher migration rate from district j to i.

On the basis of the results determined in this study, there is general acceptance of this hypothesis. For all categories of teacher, with the exception of young and middle-aged females, the pattern of migratory movement was from systems providing low average remuneration to districts in which economic benefit differentials were greater. A somewhat paradoxical role

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[1]W.W. Charters, "Some 'Obvious' Facts about the Teaching Career," Education Administration Quarterly, Vol. III, No. 2 (Spring, 1967), 193.

was played by the average salary in the case of women. Fiscal returns seem to assist in the retention of female teachers, yet do not appear as particularly appropriate strategies for the attraction of such personnel (see Table 6).

> Hypothesis 6: The higher the present value of lifetime income streams in school district i as compared to school district j, the higher the migration rate from district j to i.

Results determined in response to this hypothesis were comparable in many ways to those discussed in relation to the average salaries of teachers. Specifically, this hypothesis is accepted for young males with undergraduate training. On the other hand, the failure of female pedagogues to evidence economically rational migratory behavior is suggested for younger and older women with minimal training. In spite of the fact that statistical relevance was not achieved for the present value of lifetime earnings in relation to a greater number of the criteria employed, consideration of the relevant transition matrices leaves little doubt that fiscal returns in the form of salaries and associated benefits assume a role of considerable consequence for teacher turnover, including both migration and attrition.

> Hypothesis 7: The higher the state equalized valuation per pupil in school district i as compared to school district j, the higher the teacher migration rate from district j to district i.

On the basis of the high level of significance determined for the canonical correlation of this correlate, along with other significant statistical results and clearly defined patterns of related movement provided in the transition matrices, this hypothesis is accepted. In virtually every matrix developed, both at the state and metropolitan levels, the negative correlation between school system wealth and out-migration is evidenced.

> Hypothesis 8: The higher the total per pupil expenditure in school district i as compared to school district j, the higher the teacher migration rate from district j to i.

For male teacher migration patterns evidenced throughout the state

of Michigan, this hypothesis receives strong overall support. Exceptions were determined for female teachers who, while systematically emigrating from school districts in a pattern inversely related to per pupil expenditures, reveal a dominant tendency to accept positions in like systems or even in receiving units expending lesser amounts for education. Again it appears that for female educators the economic dimension has important implications for retention but not for attraction.

To summarize, this hypothesis is accepted for the three categories of male teachers at the state level, but because of a failure to relocate in wealthier systems on any consistent basis, is rejected in the case of females. Similarly, this postulate is viewed favorably for total SMSA teachers and for each of the component groups of males in the metropolitan area.

> Hypothesis 9: The higher the ratio of peak wages to initial entry salaries in school district i as compared to school district j, the higher the teacher migration rate from district j to district i.

This hypothesis is relevant only for the metropolitan data and is rejected. The ratio of maxima/minima salaries was not determined to be significant in any of the regression analyses completed, nor is there any evidence of regularity of migratory movement in the transition matrices created.

> Hypothesis 10: The steeper the salary schedule curve of economic return in school district i as compared to school district j, the higher the migration rate of more experienced teachers from district j to district i; conversely, the flatter the curve of economic return in district i as compared to district j, the lower the migration rate of more experienced teachers from district j to district i.

Again, as was the case for the previous postulate, this hypothesis is applicable only to the data gathered and analyzed for the metropolitan area. In general, it cannot be supported. The only criterion for which this predictor attained significance was the velocity stream flow for young males with

bachelor degree training. Results indicate that professional educators in this category emigrate from districts in which the salary gradient is flat, a finding not anticipated within the framework of this hypothesis. Based on the above results, this hypothesis is rejected.

Demographic domain

Hypotheses developed within this category relate to school system size and the distance factor. Among the predictions were:

> Hypothesis 11: The larger the school district population in school district j as compared to school district i, the higher the teacher migration rate from district i to district j.

This hypothesis, as stated, is difficult to accept on the basis of the results determined. An analysis of teacher migratory behavior at both the state and metropolitan levels reveals strong support for the general intent of this statement; namely, that larger systems experience lower rates of out-migration. This was true almost without exception, the rare deviants occurring in those categories where migrant populations were extremely small. The difficulty arises in terms of the destination units selected by those who chose to move. The greater total number of these migrants did elect school systems with larger enrollments, yet it must be recognized that there were a number of exceptions. Provided that this latter caveat is understood, general acceptance is accorded this hypothesis.

> Hypothesis 12: The greater the distance between school district i and school district j, the lower the teacher migration rate between these two districts.

With the exception of its significance in the case of Selmig at the statewide level of analysis, this hypothesis is rejected. Apparently, when considering the selectivity factor, the distance involved assumes a negative role; in other words, the likelihood of district selection decreases directly

with the distance involved. For the remainder of the analysis, no significance was determined, suggesting that for a single state such as Michigan, geographical proximity is not an important correlate.

> Hypothesis 13: The larger the school system the higher the professional attrition rate.

In formulating this supposition, it was thought that school systems enrolling greater numbers of students are associated with larger communities in which the number of career alternatives would be greater. Such was not the case and this hypothesis is rejected.

Professional/educational domain

This domain was concerned primarily with the qualifications of teachers including their institutional training background, their certification, and their academic qualifications. A total of three hypotheses were proposed, among which were:

> Hypothesis 14: The higher the ratio of provisionally certificated teachers to the total teaching force in district j, the higher the teacher migration rate from school district j.

This hypothesis received strong support in all phases of the research and is accepted without qualification.

> Hypothesis 15: The higher the ratio of teachers trained in larger, more selective teacher training institutions, the higher the professional attrition rate.

As a result of evidence derived from this research, the hypothesis is rejected; actually, the findings revealed the opposite to be true. School system populations characterized by faculties trained in higher status schools experience not only lower overall rates of attrition, but have lower out-migration flows as well.

> Hypothesis 16: The higher the ratio of teachers with bachelor's degrees or less to the total teaching force in district j, the higher the teacher migration rate from school district j.

Based on the statistical evidence and the transition matrices aggregated on the basis of the percentage of personnel with undergraduate training, this hypothesis is accepted. As anticipated, faculties which are dominated by personnel with minimal levels of educational preparation evidence a higher incidence of teacher turnover, the result of higher than average rates of out-migration and attrition.

General Conclusions

One or two comments of a general nature can be provided prior to considering conclusions more specifically relevant to migration or attrition. Evidence has been presented to reveal that the state of Michigan loses one-fifth of its teachers annually. Results of this study show that the age composition of a school system is an important predictor, both of migration and attrition rates. Young educators, and particularly young females, appear to be decidedly poor risks in terms of long-term employment. A second generalization relates to differential rates of migration and attrition for males and females. Males exhibited slightly higher district-to-district migration rates while the rate of attrition was considerably greater for women. Obviously these figures vary widely when age, sex, and even degree preparation are controlled. Nevertheless the overall relationship of males to females appears to have definite implications for faculty stability.

With regard to the results of the migratory analysis, considerable evidence was determined to show that correlates characteristic of the unit of origin were of greater importance in predicting migratory behavior. One might assume that district-to-district movement is more a function of dissatisfaction concerning certain sending unit characteristics than of knowledgeable anticipation of benefits related to the destination unit. On the other hand,

when migrants only are considered in relation to the selectivity measure, characteristics of receiving districts were found to be of greater importance.

Of interest is the overall explanatory and predictive relevance of the various predictor variable domains. In the case of the Velocity Index criterion, the Economic and Professional/Educational domains accounted for the majority of variability in the migration flows. For the regression models using the Selectivity of Migration Index as the criterion, the dominant domains were Personal and Economic. It should be noted that the Economic domain had important statistical relevance for both migration constructs used. As was emphasized earlier, strong evidence was gathered to show that this latter domain has important relevance for the supply and demand functions of teachers.

The use of a form of cost-benefit economic model in relation to teacher migration appeared to open the way to more fruitful investigation. It is possible to conclude, on the basis of the limited attempts of this study, that this approach and the employment of this type of model have important implications for the migratory behavior of teachers. For example, results from this study showed such predictors as the present value of life-time earnings streams and the steepness of salary gradient to be significantly related to the migratory behavior of young males with undergraduate training.

In the case of the Demographic domain, there are relatively few conclusions which can be stated, except to suggest that the predictor proxies employed were of limited relevance. A conclusion of some importance is that larger systems experience higher rates of teacher retention; in addition, that such movement as does occur from these larger units is in the direction of smaller suburban school districts. One possible explanation concerns the currently less desirable teaching conditions in core cities, and the identification of teachers with the general inner-city to suburb movement.

A number of important Professional/Educational predictors were identified. As an example, evidence was presented to show that the acquisition of a graduate degree generally is associated with a higher degree of professional commitment, thus resulting in higher retention rates. Further analysis of this finding revealed that while this was so for the majority of females and older males, it appears to accelerate an exodus from the profession by younger teachers generally and for middle-aged men. These latter groups appear to use teaching as a point of departure for other career patterns, positions possibly dependent upon the acquisition of a graduate degree. In the case of personnel with undergraduate training, it may be concluded that such educators evidence comparatively high overall rates of migration.

Reference has been made previously to the relevance of teacher certification and the out-of-state training for teacher turnover. Teachers with provisional teaching credentials, along with those who were trained in non-Michigan institutions evidenced higher rates of district-to-district movement. In addition, school systems that employed large numbers of teachers who had attended higher status Michigan universities and colleges enjoyed greater retention in their respective faculties.

The problem of attrition from the ranks of Michigan public school teachers is one of considerable proportion. Obviously the extent to which it is perceived as severe is dependent upon one's particular value set. However, it may be concluded that some agreement could be reached when considering the inefficient economic implications related to training personnel whose occupational tenure tends to be so short-lived.

Strong evidence was found to show that age and sex play an important role in relation to attrition. Low retention rates were

particularly relevant in the case of young teachers and more particularly young female educators. Consideration of the economic characteristics of school systems in relation to teacher dropout revealed a pattern very comparable to that determined for migration. The general conclusion is that the economic predictors employed in this research have important implications for the rate at which teachers leave the profession. The employment of lifetime income streams contributed to a further understanding of the dropout problem, satisfying the previous generalization and emphasizing the importance of the Economic domain in the retention of young educators in the state. Although the demographic predictors provided little in the way of additional insights, the educational and professional teacher background correlates revealed the same general relationships as were evident for migration. Of particular interest was the institutional training background of teachers in predicting teacher attrition.

Implications

This paper reports the results of a study which considered a broad range of school system characteristics and their importance for the supply and demand of professional classroom educators. An attempt was made in the previous section to identify a few of the conclusions which appear justified on the basis of a multitude of specific findings. These deductions, in concert with the particular results which generated them, imply suggestions which may be considered at two particular levels.

Policy and practice

It is evident that there are advantages as well as disadvantages associated with low retention rates for teachers. One advantage relates to rising costs in education and it is obvious that school systems which exhibit

low rates of teacher turnover must face higher annual per pupil expenditures for education. On the other hand, the costs, both human and fiscal, associated with extensive regular annual teacher recruitment represent a negative aspect of low retention. Clearly this list of both negative and positive attributes could be extended considerably.

However, the major implications of the migration and attrition processes as they relate to classroom teachers can be considered from the perspective of a series of decision-making units. For example, the model employed in this research concerns migration as a private investment in which the individual considers the cost-benefit implications of moving or remaining with his present school system. Or perhaps he should consider the costs and benefits associated with a career pattern other than classroom teaching. This study suggests that these are important questions, the answers to which are complex.

Assuming that the recent teacher training graduate elects to begin teaching in a school system to his satisfaction, he must then make further decisions concerning his own occupational upgrading. Results provided by this study suggest that permanent certification and the acquisition of a graduate degree are predictors of teacher retention. The question facing the individual concerns the extent to which such further educational and professional investment is profitable.

By aggregating the individual decisions of a comparatively large number of teachers, it becomes possible to consider the social implications of teacher migration and attrition. In doing so, it is recognized that the costs and returns are then those to society, one example of which might be the school system itself. Extremely important decisions must be made by elected board of education trustees and administrators, a number of the

more significant of which will relate to educational inputs in the form of qualified classroom educators. For example, results provided by this study and others[1] offer ample evidence that the time is rapidly approaching when greater prediction of teacher turnover will be possible. Consumer preferences will dictate the direction which a particular school system will adopt with regard to its recruitment policy. This suggests policy decisions based upon a large number of costs and benefits to a school unit, decisions heavily dependent upon the value set of a multitude of people. The regression models employed in this study and others provide some guidance regarding the correlates of importance; they reveal nothing concerning quality norms related to the retention of classroom teachers, however.

Extending the concept of a social decision model to the state level, two major implications are evident. The first of these concerns the availability of teacher services. Evidence was provided which demonstrated unequivocally that the youth of Michigan do not receive such services on a randomly distributed basis. Presumably, if equality of educational opportunity is one of the social purposes accepted for the public school system of Michigan, the results of this study will be of considerable concern to educational policy makers at all levels. It is possible that, on the basis of continued explanatory and predictive research such as attempted in this study, educational decision makers may be provided with sufficient information that policies can be developed which will ensure a more equitable distribution of the services of competent teachers throughout all parts of the state.

A second concern at the state level relates to the extent to which

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[1]As an example, see Joy E. Whitener, "An Actuarial Approach to Teacher Turnover," (unpublished Ed.D. dissertation, Washington University, 1965).

the state can continue to support the major cost of educating teachers whose commitment to the profession appears extremely limited. Undoubtedly the ramifications of this situation extend well beyond the economic dimension for there is no doubt that many social benefits accrue, whether or not the individual continues to teach. Viewing the problem exclusively as an economic one, however, raises serious concerns about the personnel being admitted to teacher training programs. Educational decision makers at senior levels in the state may wish to improve the social pay-offs for programs of teacher education by restricting entry, either directly or indirectly, to those cohorts for which greater professional commitment is predicted.

Research and theory

The results of this study appear to be of sufficient promise to justify further research. One such area concerns the need to determine the effects of high and low teacher turnover. It is difficult to conceive of any organization experiencing such extremes in personnel turnover without some resultant implications for the effectiveness and efficiency with which it continues to function, yet there is little of value in the way of relevant research. There is no doubt that the complexity of the educational enterprise has been an important contributor to this paucity, yet the increasing impact of scientific methodology, along with greater research competence and the use of increasingly sophisticated computational hardware, now appear to place initial attempts at answering this question closer to the realm of possibility.

Viewed from the perspective of individual decision making, one of the more fruitful areas suggested for further investigation concerns extended use of the cost-benefit model. Evidence of the relevance of the Economic

domain to the theory of human capital has been demonstrated in this analysis. However, further verification of the predictive value of the economic proxies is needed, both in relation to migration and to attrition. One possibility concerns an expansion of the type of analysis attempted within the Detroit SMSA to include the entire state and other political units.

Another possibility focuses on consideration of the recruitment procedures employed in state schools and colleges of education. A review of the relevant literature reveals extremely little has been done to assess the human inputs into teacher training programs and nothing toward relating these in any longitudinal way to productivity in the teaching profession. In a similar vein, no study of importance has been completed utilizing cost-benefit analysis techniques to evaluate the economic rationality of the state in its allocations for the training of teachers.

A final suggestion for future study dictates the need to understand a great deal more concerning the correlates of attrition from the teaching profession. Assuming the acquisition of data concerning those who leave, it would then become possible to extend the economic analysis through the use of cost-benefit techniques to comparisons of career alternatives.

By no means do the above suggestions exhaust the implications for future research which are indicated by this study's results. They do, however, reveal some initial entry points for researchers who may have interests in this important phase of the teaching-learning process. Hopefully, this research has answered more questions than it has raised; on the other hand it would be gratifying to know that it has raised sufficient questions that others will wish to pursue the problem in greater depth and with greater precision.